2109

PCDD/PCDF SAMPLING PROGRAM
AMBIENT AIR CONCENTRATION
DATA LISTING 1988-1990

SEPTEMBER 1992

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DATA LISTING 1988-1990

Report prepared by:
Atmospheric Research and Special Projects Section
Air Resources Branch
Ontario Ministry of the Environment

SEPTEMBER 1992

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PART 1: INTRODUCTION

The data listed in this report are the 1988 to 1990 results of ambient air monitoring for chlorinated dibenzo-dioxins and chlorinated furans. Monitoring for these compounds takes place in Windsor (as part of a larger study to try and assess the impact of the Greater Detroit Resource Recovery Authority's 3,000 ton per day incinerator), Toronto (as part of the Waterfront Remedial Action Plan), and Dorset (as a background site).

Samples were collected with a high-volume sampler modified to accept a polyurethane foam (PUF) vapour trap behind a teflon-coated glass-fibre particulate filter. Sample times have varied between 24 and 72 hours, however, a "standard" collection period is 48 hours. Generally, samples are collected once a month although the schedule is now 1 in 28 days to coincide with regularly scheduled site visits by APIOS (Acidic Precipitation In Ontario Study) technicians. Details are provided elsewhere[1,2,3].

Samples were spiked with $^{13}C_{12}$-TCDD, -PCDD, - HxCDD, -HpCDD, and -OCDD and then Soxhlet extracted with toluene. The extract was worked up using a modified Dow clean-up and analyzed by GC/MS/MS on a Finnigan TSQ70 in the reaction ion monitoring mode. Further details are provided by Tashiro et al[2].

International Toxicity Equivalency Factors (I-TEF) have been applied to the isomer group totals following Birmingham to calculate 2,3,7,8-TCDD toxicity equivalents (TEQ). Details are provided elsewhere[4]. The calculations are shown in the table on the next page.

In the data listings, the sample date refers to the first full day of sample collection. The sampled volume (M^3) and sample duration (HRS) are also provided. The concentration is reported followed by the number of isomers detected. If the number of isomers detected is 0, the reported concentration is the detection limit. The concentration (or detection limit) is used to calculate the TEQ which is reported beneath the concentration. For the sake of convenience, concentrations are reported to three decimal places, however, accuracy is probably no better than two significant figures. The TEQs are reported to six decimal places simply because some of the very low ambient concentrations would yield TEQs rounded to zero if fewer decimals were reported.

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[1] Ontario Ministry of the Environment, 1989. Polychlorinated Dibenzo-*p*-dioxin and Polychlorinated Dibenzofuran Monitoring Network Standard Operating Procedures and Technical Manual. November, 1989.

[2] Tashiro, C., et al, 1989. Comparison of high volume sampling techniques for dioxins and furans in ambient air. *Chemosphere*, 19 (1989), 1-6.

[3] Steer, P., et al, 1990. Ambient air sampling of polychlorinated dibenzo-*p*-dioxins and dibenzofurans in Ontario: Preliminary results. *Chemosphere*, 20(10-12), 1431-1437.

[4] Birmingham, B., 1990. Application of the International Toxicity Equivalency Factor scheme to PCDD/PCDF mixtures lacking isomer specific information. *Chemosphere*, 20(7-9), 815-820.

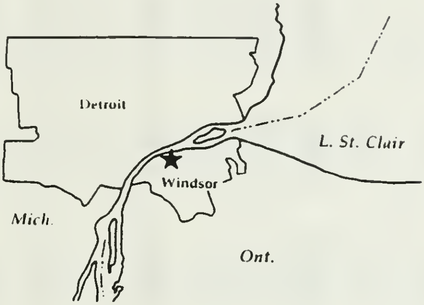
TEQ Calculation From Group Total Concentration.

Dioxins			%AAC		I-TEF		
T_4CDD	concentration	*	0.05	*	1	=	TEQ
P_5CDD	concentration	*	0.10	*	0.5	=	TEQ
H_6CDD	concentration	*	0.30	*	0.1	=	TEQ
H_7CDD	concentration	*	0.50	*	0.01	=	TEQ
O_8CDD	concentration	*	1.00	*	0.001	=	TEQ
Furans			%AAC		I-TEF		
T_4CDF	concentration	*	0.10	*	0.1	=	TEQ
P_5CDF	concentration	*	0.15	*	0.5	=	TEQ
P_5CDF	concentration	*	0.10	*	0.05	=	TEQ
H_6CDF	concentration	*	0.50	*	0.1	=	TEQ
H_7CDF	concentration	*	0.50	*	0.01	=	TEQ
O_8CDF	concentration	*	1.00	*	0.001	=	TEQ

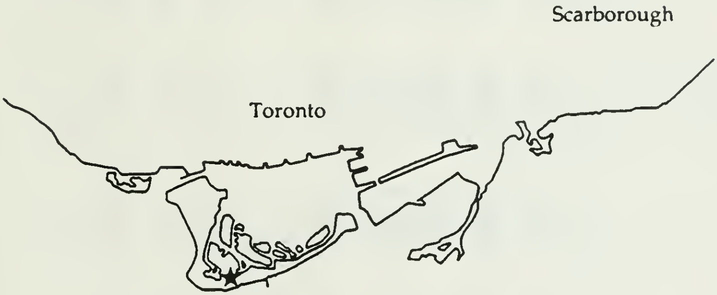
%AAC is percent of toxic isomers in ambient air concentrations.
(e.g. 10% of the T_4CDF ambient air concentration is expected to be 2,3,7,8-CDF)

PART II: STATION DESCRIPTION AND LOCATION MAP

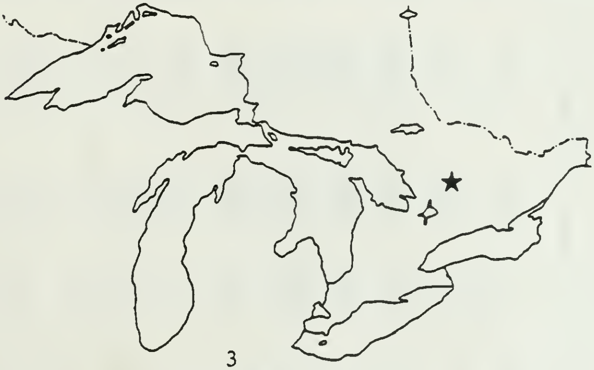
A. Windsor: station 12008; 467 University Avenue; latitude 42° 18′ 57″; longitude 83° 02′ 36″.



B. Toronto: station 31025; Toronto Island; latitude 43° 37′ 54″; longitude 79° 23′ 49″.



C. Dorset: station 49014; Dorset Research Facility; latitude 45° 13′ 22″; longitude 78° 55′ 51″.



ONTARIO MINISTRY OF THE ENVIRONMENT

AMBIENT AIR CONCENTRATIONS OF CHLORINATED DIOXINS AND FURANS

(pg/m**3)

1988

Station: 12008 - WINDSOR - UNIVERSITY AVENUE

SAMP_DATE	M^3 (HRS)	T4CDD #I TEQ	P5CDD #I TEQ	H6CDD #I TEQ	H7CDD #I TEQ	O8CDD #I TEQ	T4CDF #I TEQ	P5CDF #I TEQ	H6CDF #I TEQ	H7CDF #I TEQ	O8CDF #I TEQ
25-Aug-88	1733 (48.1)	0.092 5 0.004600	0.100 5 0.005000	0.250 6 0.007500	1.900 2 0.009500	2.300 1 0.002300	0.300 8 0.003000	0.170 10 0.013600	0.190 10 0.009500	1.260 3 0.006300	0.300 1 0.000300
18-Sep-88	1427 (48.0)	1.102 8 0.055100	0.110 9 0.005500	0.400 7 0.012000	0.300 2 0.004500	0.800 1 0.000800	0.600 11 0.006000	0.250 8 0.020000	0.300 7 0.015000	0.900 4 0.004500	0.120 1 0.000120
12-Oct-88	1457 (48.0)	0.400 8 0.020000	0.300 11 0.015000	0.700 7 0.021000	1.300 2 0.006500	8.600 1 0.008600	1.500 13 0.015000	0.900 10 0.072000	0.900 10 0.045000	0.900 4 0.004500	0.500 1 0.000500
05-Nov-88	1522 (48.0)	0.500 9 0.025000	0.300 12 0.015000	0.600 6 0.018000	0.300 2 0.001500	0.500 1 0.000500	1.400 12 0.014000	0.600 8 0.048000	0.400 9 0.020000	0.300 4 0.001500	0.100 1 0.000100
23-Dec-88	666 (24.0)	0.300 6 0.015000	0.040 1 0.002000	0.060 0 0.001800	0.300 2 0.001500	0.600 1 0.000600	0.900 13 0.009000	0.100 1 0.008000	0.060 0 0.003000	0.200 0 0.001000	0.200 0 0.000200

ONTARIO MINISTRY OF THE ENVIRONMENT

AMBIENT AIR CONCENTRATIONS OF CHLORINATED DIOXINS AND FURANS

(pg/m**3)

1989

Station: 12008 - WINDSOR - UNIVERSITY AVENUE

SAMP_DATE	M^3 (HRS)	T4CDD #I TEQ	P5CDD #I TEQ	H6CDD #I TEQ	H7CDD #I TEQ	O8CDD #I TEQ	T4CDF #I TEQ	P5CDF #I TEQ	H6CDF #I TEQ	H7CDF #I TEQ	O8CDF #I TEQ
05-Mar-89	1077 (48.0)	0.900 5 0.045000	0.100 10 0.005000	0.400 6 0.012000	0.500 2 0.002500	1.100 1 0.001100	0.600 12 0.006000	0.200 11 0.016000	0.200 7 0.010000	0.200 3 0.001000	0.090 1 0.000090
22-Apr-89	1329 (48.0)	2.300 8 0.115000	0.050 11 0.002500	0.200 7 0.006000	0.400 2 0.002000	1.500 0 0.001500	28.000 13 0.280000	0.800 11 0.064000	0.400 10 0.020000	0.300 4 0.001500	0.200 0 0.000200
03-Jul-89	1565 (24.0)	0.180 10 0.009000	0.240 11 0.012000	0.380 7 0.011400	2.800 2 0.014000	2.300 1 0.002300	1.800 15 0.018000	1.000 9 0.080000	1.000 9 0.050000	0.420 4 0.002100	0.330 1 0.000330
27-Jul-89	1647 (24.0)	0.430 7 0.021500	0.400 11 0.020000	0.310 6 0.009300	0.050 0 0.000250	0.050 0 0.000050	1.500 16 0.015000	0.610 8 0.048800	0.430 9 0.021500	0.130 3 0.000650	0.009 1 0.000009
20-Aug-89	1565 (24.0)	0.250 7 0.012500	0.190 11 0.009500	0.380 6 0.011400	0.380 2 0.001900	0.750 1 0.000750	1.300 15 0.013000	0.370 9 0.029600	0.280 8 0.014000	0.160 4 0.000800	0.090 1 0.000090
13-Sep-89	1499 (24.0)	1.800 13 0.090000	2.700 12 0.135000	1.700 8 0.051000	0.940 2 0.004700	1.000 1 0.001000	8.400 16 0.084000	6.100 8 0.488000	2.900 7 0.145000	1.600 4 0.008000	0.370 1 0.000370
24-Nov-89	889 (24.0)	0.400 6 0.020000	0.400 6 0.020000	0.900 6 0.027000	1.400 2 0.007000	1.900 1 0.001900	1.500 14 0.015000	0.700 10 0.056000	0.600 9 0.030000	1.000 4 0.005000	0.400 1 0.000400
18-Dec-89	905 (24.0)	3.900 8 0.195000	7.200 9 0.360000	6.500 6 0.195000	5.200 2 0.026000	4.100 1 0.004100	7.200 18 0.072000	7.500 12 0.600000	5.000 8 0.250000	5.600 2 0.028000	1.500 1 0.001500

ONTARIO MINISTRY OF THE ENVIRONMENT

AMBIENT AIR CONCENTRATIONS OF CHLORINATED DIOXINS AND FURANS

(pg/m**3)

1990

Station: 12008 - WINDSOR - UNIVERSITY AVENUE

SAMP_DATE	M³ (HRS)	T4CDD #I TEQ	P5CDD #1 TEQ	H6CDD #I TEQ	H7CDD #I TEQ	O8CDD #I TEQ	T4CDF #I TEQ	P5CDF #1 TEQ	H6CDF #I TEQ	H7CDF #I TEQ	O8CDF #I TEQ
24-Jan-90	2239 (48.0)	0.140 5 0.007000	0.210 9 0.010500	0.530 7 0.015900	1.400 2 0.007000	1.700 1 0.001700	0.670 14 0.006700	0.180 9 0.014400	0.210 6 0.010500	0.260 4 0.001300	0.100 1 0.000100
21-Feb-90	3663 (48.0)	0.250 8 0.012500	0.250 12 0.012500	0.340 7 0.010200	0.640 2 0.003200	1.300 1 0.001300	1.900 16 0.019000	0.840 12 0.067200	0.520 11 0.026000	0.620 4 0.003100	0.330 1 0.000330
21-Mar-90	3653 (48.0)	0.300 6 0.015000	0.200 11 0.010000	0.400 6 0.012000	0.500 2 0.002500	1.000 1 0.001000	2.000 15 0.020000	0.900 10 0.072000	0.300 9 0.015000	0.200 4 0.001000	0.100 1 0.000100
17-Apr-90	3170 (48.0)	0.300 7 0.015000	0.300 6 0.015000	0.300 6 0.009000	0.300 2 0.001500	0.500 1 0.000500	1.100 14 0.011000	0.500 12 0.040000	0.400 10 0.020000	0.300 4 0.001500	0.300 1 0.000300
17-May-90	1969 (24.0)	0.242 5 0.012100	0.054 3 0.002700	0.039 2 0.001170	0.115 2 0.000575	0.240 1 0.000240	0.607 10 0.006070	0.054 7 0.004320	0.039 2 0.001950	0.115 1 0.000575	0.240 1 0.000240
12-Jun-90	4624 (60.0)	0.165 7 0.008250	0.161 11 0.008050	0.103 3 0.003090	0.136 2 0.000680	0.280 1 0.000280	0.693 14 0.006930	0.443 11 0.035440	0.184 8 0.009200	0.123 3 0.000615	0.106 1 0.000106
11-Jul-90	3367 (48.0)	1.304 11 0.065200	0.443 9 0.022150	0.344 5 0.010320	0.137 2 0.000685	0.236 1 0.000236	1.391 12 0.013910	1.180 12 0.094400	0.568 3 0.028400	0.257 2 0.001285	0.079 1 0.000079
08-Aug-90	1723 (23.7)	0.570 6 0.028500	0.130 6 0.006500	0.150 6 0.004500	0.120 1 0.000600	0.028 1 0.000028	1.200 15 0.012000	0.150 5 0.012000	0.027 1 0.001350	0.019 0 0.000095	0.013 0 0.000013
05-Sep-90	3737 (48.0)	0.290 4 0.014500	0.200 7 0.010000	0.090 3 0.002700	0.077 1 0.000385	0.400 1 0.000400	0.440 12 0.004400	0.290 3 0.023200	0.071 2 0.003550	0.044 1 0.000220	0.160 1 0.000160
03-Oct-90	3556 (48.0)	0.055 3 0.002750	0.031 1 0.001550	0.062 2 0.001860	0.110 2 0.000550	0.330 1 0.000330	0.540 13 0.005400	0.230 9 0.018400	0.087 3 0.004350	0.025 0 0.000125	0.038 1 0.000038
31-Oct-90	3274 (48.0)	0.250 8 0.012500	0.150 10 0.007500	0.320 7 0.009600	0.910 2 0.004550	2.400 1 0.002400	0.950 19 0.009500	0.390 11 0.031200	0.220 7 0.011000	0.310 4 0.001550	0.240 1 0.000240
28-Nov-90	1156 (24.7)	0.028 1 0.001400	0.030 0 0.001500	0.091 4 0.002730	0.120 2 0.000600	0.330 1 0.000330	0.042 1 0.000420	0.028 0 0.002240	0.076 3 0.003800	0.094 3 0.000470	0.058 1 0.000058
26-Dec-90	2482 (48.0)	0.360 10 0.018000	0.500 11 0.025000	0.920 7 0.027600	1.300 2 0.006500	1.800 1 0.001800	1.100 17 0.011000	0.530 11 0.042400	0.550 10 0.027500	0.770 4 0.003850	0.220 1 0.000220

ONTARIO MINISTRY OF THE ENVIRONMENT

AMBIENT AIR CONCENTRATIONS OF CHLORINATED DIOXINS AND FURANS

(pg/m**3)

1988

Station: 31025 - TORONTO ISLAND

SAMP DATE	M³ (HRS)	T4CDD #I TEQ	P5CDD #I TEQ	H6CDD #I TEQ	H7CDD #1 TEQ	O8CDD #I TEQ	T4CDF #I TEQ	P5CDF #I TEQ	H6CDF #I TEQ	H7CDF #I TEQ	O8CDF #1 TEQ
14-Sep-88	3853 (72.0)	0.100 9 0.005000	0.200 10 0.010000	0.200 6 0.006000	0.100 2 0.000500	0.300 1 0.000300	0.200 14 0.002000	0.100 12 0.008000	0.100 12 0.005000	0.100 4 0.000500	0.050 1 0.000050
12-Oct-88	2434 (72.0)	0.050 2 0.002500	0.004 0 0.000200	0.040 5 0.001200	2.800 2 0.014000	1.200 1 0.001200	0.020 12 0.000200	0.002 0 0.000160	0.020 3 0.001000	0.200 2 0.001000	0.200 1 0.000200
10-Nov-88	1626 (72.0)	0.100 9 0.005000	0.060 10 0.003000	0.200 6 0.006000	0.200 2 0.001000	0.400 1 0.000400	0.300 14 0.003000	0.090 10 0.007200	0.100 8 0.005000	0.100 4 0.000500	0.060 1 0.000060
07-Dec-88	1924 (72.0)	0.500 8 0.025000	0.200 11 0.010000	0.500 6 0.015000	0.500 2 0.002500	0.800 1 0.000800	1.200 12 0.012000	0.200 7 0.016000	0.500 7 0.025000	0.500 4 0.002500	0.300 1 0.000300

ONTARIO MINISTRY OF THE ENVIRONMENT

AMBIENT AIR CONCENTRATIONS OF CHLORINATED DIOXINS AND FURANS

(pg/m**3)

1989

Station: 31025 - TORONTO ISLAND

SAMP_DATE	M³ (HRS)	T4CDD #I TEQ	P5CDD #I TEQ	H6CDD #I TEQ	H7CDD #I TEQ	O8CDD #I TEQ	T4CDF #1 TEQ	P5CDF #I TEQ	H6CDF #I TEQ	H7CDF #I TEQ	O8CDF #I TEQ
18-Jan-89	2149	0.100 8	0.100 11	0.500 6	0.400 2	0.700 1	0.500 14	0.200 8	0.300 10	0.300 4	0.100 1
	(72.0)	0.005000	0.005000	0.015000	0.002000	0.000700	0.005000	0.016000	0.015000	0.001500	0.000100
21-Jul-89	2732	0.077 8	0.040 10	0.033 3	0.048 2	0.190 1	0.290 15	0.140 7	0.130 8	0.066 3	0.043 1
	(48.0)	0.003850	0.002000	0.000990	0.000240	0.000190	0.002900	0.011200	0.006500	0.000330	0.000043
12-Sep-89	5543	0.140 10	0.190 12	0.210 7	0.150 2	0.260 1	2.400 14	1.200 10	0.740 9	0.510 4	0.380 1
	(118.4)	0.007000	0.009500	0.006300	0.000750	0.000260	0.024000	0.096000	0.037000	0.002550	0.000380

ONTARIO MINISTRY OF THE ENVIRONMENT

AMBIENT AIR CONCENTRATIONS OF CHLORINATED DIOXINS AND FURANS

(pg/m**3)

1990

Station: 31025 - TORONTO ISLAND

SAMP_DATE	M^3 (HRS)	T4CDD #I TEQ	P5CDD #I TEQ	H6CDD #I TEQ	H7CDD #I TEQ	O8CDD #I TEQ	T4CDF #I TEQ	P5CDF #I TEQ	H6CDF #I TEQ	H7CDF #I TEQ	O8CDF #I TEQ
14-Jun-90	985 (??.?)	0.058 0 0.002900	0.131 0 0.006550	0.130 0 0.003900	0.106 0 0.000530	0.183 1 0.000183	0.046 0 0.000460	0.156 0 0.012480	0.140 0 0.007000	0.038 0 0.000190	0.166 0 0.000166
03-Oct-90	3240 (48.0)	0.016 2 0.000800	0.014 1 0.000700	0.100 3 0.003000	0.270 2 0.001350	0.470 1 0.000470	0.160 13 0.001600	0.110 9 0.008800	0.092 4 0.004600	0.044 1 0.000220	0.054 1 0.000054
31-Oct-90	3585 (48.1)	0.150 7 0.007500	0.180 11 0.009000	0.320 7 0.009600	0.360 2 0.001800	0.480 1 0.000480	0.780 19 0.007800	0.440 9 0.035200	0.380 12 0.019000	0.150 4 0.000750	0.077 1 0.000077
28-Nov-90	3351 (48.0)	0.009 1 0.000450	0.013 0 0.000650	0.064 5 0.001920	0.130 2 0.000650	0.180 1 0.000180	0.058 11 0.000580	0.010 0 0.000800	0.046 4 0.002300	0.064 4 0.000320	0.039 1 0.000039
25-Dec-90	2217 (48.1)	0.014 0 0.000700	0.017 0 0.000850	0.091 4 0.002730	0.200 2 0.001000	0.350 1 0.000350	0.014 0 0.000140	0.015 0 0.001200	0.026 2 0.001300	0.110 3 0.000550	0.039 1 0.000039

Notes: 1) Sample duration for 14-Jun-90 is unknown.
2) There is a small degree of uncertainty associated with the start date of 25-Dec-90 (it might have been 24-Dec-90).

ONTARIO MINISTRY OF THE ENVIRONMENT

AMBIENT AIR CONCENTRATIONS OF CHLORINATED DIOXINS AND FURANS

(pg/m**3)

1988

Station: 49014 - DORSET RESEARCH CENTRE

SAMP_DATE	M³ (HRS)	T4CDD #I TEQ	P5CDD #I TEQ	H6CDD #I TEQ	H7CDD #I TEQ	O8CDD #I TEQ	T4CDF #I TEQ	P5CDF #I TEQ	H6CDF #I TEQ	H7CDF #I TEQ	O8CDF #I TEQ
13-Sep-88	2280 (72.0)	0.200 8 0.010000	0.040 10 0.002000	0.200 6 0.006000	0.100 2 0.000500	0.200 1 0.000200	0.200 11 0.002000	0.030 5 0.002400	0.090 7 0.004500	0.050 3 0.000250	0.020 1 0.000020
11-Oct-88	1838 (72.0)	0.100 2 0.005000	0.010 0 0.000500	0.009 0 0.000270	0.040 2 0.000200	0.100 1 0.000100	0.020 1 0.000200	0.009 0 0.000720	0.010 1 0.000500	0.010 1 0.000050	0.020 1 0.000020
08-Nov-88	2005 (72.0)	0.080 8 0.004000	0.040 9 0.002000	0.100 6 0.003000	0.200 2 0.001000	0.400 1 0.000400	0.100 13 0.001000	0.070 7 0.005600	0.070 8 0.003500	0.100 4 0.000500	0.060 1 0.000060
06-Dec-88	1903 (72.0)	0.100 7 0.005000	0.050 10 0.002500	0.200 7 0.006000	0.300 2 0.001500	0.600 1 0.000600	0.200 13 0.002000	0.100 11 0.008000	0.100 8 0.005000	0.100 3 0.000500	0.070 1 0.000070

ONTARIO MINISTRY OF THE ENVIRONMENT

AMBIENT AIR CONCENTRATIONS OF CHLORINATED DIOXINS AND FURANS

(pg/m**3)

1989

Station: 49014 - DORSET RESEARCH CENTRE

SAMP_DATE	M^3 (HRS)	T4CDD #1 TEQ	P5CDD #I TEQ	H6CDD #I TEQ	H7CDD #1 TEQ	O8CDD #I TEQ	T4CDF #I TEQ	P5CDF #I TEQ	H6CDF #1 TEQ	H7CDF #I TEQ	O8CDF #I TEQ
17-Jan-89	1507 (72.0)	0.100 8 0.005000	0.060 10 0.003000	0.300 7 0.009000	2.200 2 0.011000	6.800 1 0.006800	0.300 14 0.003000	0.800 6 0.064000	0.100 4 0.005000	1.300 2 0.006500	0.800 1 0.000800
18-Jul-89	5403 (71.0)	0.033 4 0.001650	0.015 7 0.000750	0.064 5 0.001920	0.033 2 0.000165	0.110 1 0.000110	0.070 14 0.000700	0.023 7 0.001840	0.072 5 0.003600	0.011 3 0.000055	0.008 1 0.000008
24-Oct-89	3715 (72.0)	0.004 6 0.000185	0.003 2 0.000150	0.007 2 0.000195	0.013 2 0.000065	0.045 1 0.000045	0.033 11 0.000330	0.018 5 0.001440	0.007 2 0.000335	0.005 3 0.000027	0.003 1 0.000003
21-Nov-89	2656 (60.0)	0.005 0 0.000250	0.023 2 0.001150	0.044 2 0.001320	0.164 2 0.000820	0.150 0 0.000150	0.017 1 0.000170	0.038 3 0.003040	0.011 0 0.000550	0.036 0 0.000180	0.044 0 0.000044
27-Dec-89	5740 (72.1)	0.004 1 0.000200	0.019 2 0.000950	0.201 5 0.006030	0.248 2 0.001240	0.150 0 0.000150	0.084 7 0.000840	0.020 1 0.001600	0.044 2 0.002200	0.052 1 0.000260	0.034 0 0.000034

ONTARIO MINISTRY OF THE ENVIRONMENT

AMBIENT AIR CONCENTRATIONS OF CHLORINATED DIOXINS AND FURANS

(pg/m**3)

1990

Station: 49014 - DORSET RESEARCH CENTRE

SAMP_DATE	M^3 (HRS)	T4CDD #I TEQ	P5CDD #I TEQ	H6CDD #I TEQ	H7CDD #I TEQ	O8CDD #I TEQ	T4CDF #I TEQ	P5CDF #I TEQ	H6CDF #I TEQ	H7CDF #I TEQ	O8CDF #I TEQ
24-Jan-90	3606 (48.1)	0.030 6 0.001500	0.020 4 0.001000	0.040 4 0.001200	0.120 2 0.000600	0.060 0 0.000060	0.270 15 0.002700	0.070 10 0.005600	0.090 6 0.004500	0.060 4 0.000300	0.020 1 0.000020
21-Mar-90	3773 (48.3)	1.200 5 0.060000	0.100 5 0.005000	0.500 8 0.015000	2.200 2 0.011000	5.200 1 0.005200	1.600 16 0.016000	0.600 11 0.048000	0.300 4 0.015000	0.600 3 0.003000	0.100 1 0.000100
18-Apr-90	3825 (48.0)	0.040 3 0.002000	0.010 2 0.000500	0.020 2 0.000600	0.050 2 0.000250	0.100 1 0.000100	0.080 11 0.000800	0.020 2 0.001600	0.010 1 0.000500	0.020 1 0.000100	0.030 0 0.000030
16-May-90	3490 (48.0)	0.059 1 0.002950	0.024 0 0.001200	0.023 0 0.000690	0.029 2 0.000145	0.060 1 0.000060	0.037 2 0.000370	0.023 0 0.001840	0.023 0 0.001150	0.019 0 0.000095	0.077 0 0.000077
13-Jun-90	3688 (48.0)	0.127 1 0.006350	0.009 0 0.000450	0.011 0 0.000330	0.063 2 0.000315	0.152 1 0.000152	0.453 11 0.004530	0.034 1 0.002720	0.033 2 0.001650	0.037 1 0.000185	0.040 1 0.000040
11-Jul-90	3372 (48.0)	0.075 1 0.003750	0.012 0 0.000600	0.016 0 0.000480	0.042 2 0.000210	0.137 1 0.000137	0.054 3 0.000540	0.010 0 0.000800	0.014 0 0.000700	0.013 0 0.000065	0.027 0 0.000027
18-Aug-90	3872 (48.0)	0.140 2 0.007000	0.340 2 0.017000	0.006 0 0.000180	0.019 0 0.000095	0.016 0 0.000016	0.420 12 0.004200	0.290 1 0.023200	0.015 0 0.000750	0.062 0 0.000310	0.020 0 0.000020
03-Oct-90	3665 (48.1)	0.004 0 0.000200	0.006 0 0.000300	0.027 0 0.000810	0.081 2 0.000405	0.210 1 0.000210	0.007 0 0.000070	0.014 1 0.001120	0.019 2 0.000950	0.024 3 0.000120	0.017 1 0.000017
31-Oct-90	3623 (48.0)	0.120 5 0.006000	0.500 10 0.025000	1.500 7 0.045000	3.000 2 0.015000	4.800 1 0.004800	0.100 5 0.001000	0.047 5 0.003760	0.160 6 0.008000	0.230 4 0.001150	0.120 1 0.000120
28-Nov-90	2916 (48.0)	0.011 0 0.000550	0.015 0 0.000750	0.027 3 0.000810	0.070 2 0.000350	0.110 1 0.000110	0.010 0 0.000100	0.012 0 0.000960	0.012 2 0.000600	0.014 1 0.000070	0.023 1 0.000023
26-Dec-90	2756 (48.1)	0.008 0 0.000400	0.013 0 0.000650	0.034 2 0.001020	0.120 2 0.000600	0.260 1 0.000260	0.008 0 0.000080	0.017 0 0.001360	0.015 0 0.000750	0.056 3 0.000280	0.014 0 0.000014

PART IV: SUMMARY AND INTERPRETATION

It is beyond the scope of this document to provide a detailed interpretation of the results from the ambient air monitoring program, however, it is appropriate to briefly put the results in context.

The concentration listings in PART III are summarized in the table below. The Province of Ontario currently has an interim standard for PCDD/CDF calculated as:

$$(A) + (B/50) \leq 30\ pg/m^3$$

where A is average dioxin concentration and B is average furan concentration, both in pg/m^3.

For data sets with a constant detection limit and fewer than 50% non-detects, means calculated by substituting the detection limit for non-detects are not significantly different from means calculated by using half the detection limit or by setting the detection limit equal to zero (Steer and Diamond, internal memorandum). For data sets in which the detection limit changes from sample to sample (such as PCDD/CDF) it is less clear which method to use. Given the concern surrounding PCDD/CDF it is probably better to be more conservative rather than less, and so, when calculating averages, the reported detection limit was used for any non-detect results.

As may be seen from the table, ambient air concentrations of PCDD/CDF in Windsor, Toronto, and Dorset are well below the Provincial interim standard of 30 pg/m^3. The relatively high result for Windsor in 1989 is caused by a single sample, however, the number is still more than 4 times lower than the interim standard.

	Year	n	Mean Dioxin (A)	Mean Furan (B)	(A)+(B/50)
WINDSOR	1988	5	4.551	2.670	4.604
	1989	8	7.113	11.349	7.339
	1990	13	2.078	2.055	2.119
TORONTO	1988	4	2.113	1.085	2.135
	1989	3	1.046	2.433	1.095
	1990	5	0.807	0.651	0.820
DORSET	1988	4	0.767	0.357	0.774
	1989	5	2.159	0.786	2.175
	1990	11	1.997	0.590	2.009
The last column may be compared with the interim standard of 30 pg/m^3.					

All other results fall between 6.5 times lower than the interim standard (Windsor 1988) and 39 times lower (Dorset 1988).

It should be noted that these numbers are conservative because non-detects were replaced with the detection limit when calculating the averages.

The Ministry currently has under consideration a multi-media based guideline based upon the use of Toxic Equivalency Factors.